

temporal shield, which is in contact with the second upper post-orbital. Three large shield-like scales behind the occipitals. Dull brownish green; each scale on the front part of the trunk with a black tip. Scales and shields of the tail with a narrow black margin.

Total length 64 inches; tail 15 inches.

One specimen has been obtained by Dr. Welwitsch in Golungo Alto, a district in Angola.

Dendraspis angusticeps, Smith. Pl. III. fig. B.

Scales in seventeen or nineteen rows; ventrals 226-270. Two very large anterior temporals, the upper of which extends as far backwards as the occipital.

Southern and Western Africa.

Dendraspis intermedius. Pl. III. fig. C.

Scales in nineteen rows; ventrals 206; subcaudals 112. Upper labials eight, the sixth being the largest, the seventh and eighth small; temporals 2+3; both anterior temporals in contact with the postoculars, and not extending as far backwards as the occipitals. Uniform green, with a few scattered yellowish spots. Inside of the mouth white.

One specimen, 55 inches long, tail 13 inches, was received from the Zambesi River.

Dendraspis polylepis. Pl. III. fig. D.

Günth. Proc. Zool. Soc. June 28, 1864.

Scales in twenty-three rows; ventrals 258; subcaudals 120. Temporals 2+3; both anterior temporals in contact with the postoculars. Dull greenish olive; hind part of the body and tail with small irregular blackish spots; inside of the mouth black.

Zambesi.

XIII.—On the Genera and Species of British Echinodermata.

By the Rev. ALFRED MERLE NORMAN, M.A.

PART I.

CRINOIDEA—OPHIUROIDEA—ASTEROIDEA.

TWENTY-FOUR years is a long period in the history of our knowledge of any class in the animal kingdom; and such is the time which has elapsed since our latest and, indeed, only monograph on British Starfishes was published; and Prof. Forbes's work still remains our only authority on the subject. In the interim, however, not only has very much been learnt respecting the

anatomy, physiology, and reproduction of the Echinodermata, which is beyond the scope of the present paper, but not a few memoirs have appeared on the Continent which have thrown additional light on the general organization and arrangement of these animals; and the writings of Agassiz, Sars, Lütken, Von Düben, Koren, J. Müller, Troschel, Gray, Forbes (subsequent papers), Grube, Dujardin, and Hupé, &c., bear testimony to the great need there is of a complete revision of the nomenclature and classification of the Echinodermata which inhabit the British seas. Such a revision is the more required because at the time when Professor Forbes wrote his monograph the laws of zoological nomenclature were not so fully recognized as they are at the present day, and thus a later name was frequently applied to a species while the author was fully conscious that the animal had been described under another name at an earlier date.

For some time past we have been urged by friends interested in the study of the Echinodermata to prepare such a revision, the want of which has been very generally felt. In the following paper we will attempt to do so. The object which we shall have in view is fourfold: 1st, to revise the nomenclature of the species described in the 'History of British Starfishes,' and redistribute them in the genera now generally recognized; 2ndly, to give the characters of all the orders, families, and genera; 3rdly, to describe all those species which have been discovered in our seas since the publication of Forbes's work, or which require to be redescribed in order that they may be more readily distinguished from certain allied forms now incorporated in our lists; 4thly, to give some information as to the geographical distribution of the species.

Among the Echinodermata which will be here introduced as supplemental to those of Forbes's work are many which have not hitherto been published as British, though some of them have been mentioned as additions to our fauna, and exhibited by the author at recent meetings of the British Association.

We have adopted a plan with respect to the synonymy which will at once show the reader why we have employed the name which is here given to the species. The dates prefixed to the references, and the brief notes here and there appended to them, will in most cases, without any paragraph-observations, suffice to render obvious the causes of any change in nomenclature which may have been made. We have given as few references as are consistent with the end to be attained. To writers of earlier date than Forbes we have only referred when it was necessary to establish the date of a name. The synonymy quoted from more recent writers is intended to show what authors first introduced any particular change of name, or, in some cases,

have best described and perhaps figured the species. With respect to the species more recently introduced into our list of Echinodermata, such references to other works are given as were thought likely to be of service to the student.

Specimens have been examined by the author from every British locality which is given for the rarer species, unless the name of the locality is inserted between inverted commas.

The following is necessary to explain the measurements employed:—The “lesser radius” is a line drawn from the centre of the disk to its edge, between two of the arms; and the “greater radius” is the distance from the centre of the disk to the extremity of an arm. Similarly, the “lesser diameter” is the width across the disk; and the “greater diameter” the measurement from tip to tip of the arms.

The second part of this paper, on the *Echinoidea* and *Holothuroidea*, will, we hope, be illustrated by figures of the spicula of the species of the last-named most difficult order. The author will be much obliged to any naturalists who will send to him for examination any Holothuroidea which they may think of interest; and it would be a great assistance should any reader of these notes be able to inform him where the type, or, indeed, any specimens are to be found of the following species—*Psolinus brevis*, *Cucumaria fusiformis*, *C. fucicola*, *C. Drummondii*, *C. Montagu*, *C. Neillii*, *C. dissimilis*, *Thyone Portlockii*,—or British specimens of *Holothuria intestinalis* and *H. tubulosa*.

It only remains to conclude these introductory remarks by returning our sincere thanks to the friends who have so kindly assisted us in various ways while collecting information and preparing this paper. Our acknowledgments are more especially due to Mr. Alder, Prof. Wyville Thompson, Mr. Jeffreys, Dr. E. Percival Wright, Mr. Patterson, Mr. Hodge, Mr. T. Edward, and Mr. D. Robertson.

Class *ECHINODERMATA*.

Order I. CRINOIDEA.

Body pentagonal or round, more or less conical, either sessile and adherent by the aboral surface or supported (sometimes, as in *Antedon*, only in the young state, and then free in the adult) on a multiarticulate, solid, calcareous peduncular column of great length, the base of which is firmly cemented to foreign bodies. Arms five, solid, multiarticulate, proceeding from the aboral and inferior surface, dichotomously branched from near the base, and frequently again and again subdivided; ultimately pinnate; not furnished with any spines, but having numerous marginal tentacula. Aboral and inferior side of body formed by

the basal joints of the arms united with a calyx-shaped base, which is composed either of a single calcareous piece or of numerous angulated plates closely cemented together. Mouth and anus both superior, and distinct from each other. Respiration (in *Antedon*) chiefly effected by means of the tentacula which fringe the sides of the arms and pinnules, and the ciliated surface of channels which traverse the upper side of the arms. No madreporiform tubercle. Sexes distinct. Ovaries externally conspicuous, attached to the sides of the pinnules or ultimate subdivisions of the arms.

Fam. Antedonidæ.

Young animal cemented to stones, shells, or sea-weed by a multiarticulate peduncle of considerable length, originating from the aboral and inferior calyx-formed side of the body. Adult animal free (a separation having taken place at the junction of the peduncle with the calyx), having the calyx furnished with numerous many-jointed and clawed cirrhi, by means of which it clings at will to *Laminariæ* or other bodies. Arms bifurcating close to the base, beneath the surface of the body, and in some foreign species again and again subdivided; composed of joints which are transversely somewhat wedge-formed, so that they are alternately wider on either side of the arms; each such joint on its wider side gives support to a multi-articulate pinnule. Oral surface of the body covered with a thin membranous skin.

Genus I. ANTEDON, Fréminville.

[*Antedon*, Fréminville, 1811; *Alecto*, Leach, 1815; *Comatula*, Lamarck, 1816.]

Mouth central. Anus lateral. Calyx or aboral surface composed of a single piece, with which the five radial plates of the base of the arms articulate. Arms with two or three basal joints, after which they bifurcate, and in some foreign species are subsequently a second and even third time subdivided.

We feel that we have no choice. The name of *Antedon* must be employed in preference to that of *Comatula*. Fréminville's genus has five years' precedence over that of Lamarck, and was thus clearly defined (Bull. Soc. Philomatique de Paris, vol. ii. 1811, p. 349):—"Animal libre, à corps discoïde, calcaire en dessus, gélatineux en dessous, environné de deux rangs de rayons articulés, pierreux, percés dans leur largeur d'un trou central; ceux du rang supérieur plus courts, simples et d'égale grosseur dans toute leur longueur; ceux du rang inférieur plus longs, allant en diminuant de la base à la pointe, et garnis dans toute leur longueur d'appendices alternes également articulés;

bouche inférieure et centrale;” and he refers to the figure in the “Encyclopédie Méthodique,” pl. 124. fig. 6, which represents “*Comatula rosacea*” or a closely allied species. Justice, therefore, and the laws of nomenclature compel us to adopt Fréminville’s genus. Had *Comatula* obtained universal acceptance, usage might have been pleaded in its favour; but it has no such claim. J. Müller, the chief authority on the family, has adopted Leach’s genus *Alecto* (Archiv für Naturgeschichte’ for 1841 and 1843); and in this he has been followed by most, if not all, of the Scandinavian writers. *Alecto*, however, was constituted subsequently to *Antedon*; and, moreover, if it were employed among the Crinoidea, the same name applied to a genus established in 1821 by Lamouroux for a section of the Polyzoa, and which has been generally received, would require to be superseded.

Antedon rosaceus (Linck).

1828. *Comatula rosacea*, Fleming, Hist. British Animals, p. 490.

1841. *Comatula rosacea*, Forbes, British Starfishes, p. 5.

1844. *Alecto Petasus*, Von Düben and Koren, Öfversigt af Skandinaviens Echinodermer, Kongl. Vetensk. Akad. Handl. p. 229, pl. 6. fig. 1.

1848. *Antedon decameros*, Gray, Brit. Mus. Cat. Brit. Radiata, p. 28.

“Perisom of the disk naked, or with scattered tubercles containing groups of radiating calcareous spicules. Centro-dorsal plate convex, flattened at the apex, its sides covered with dorsal cirrhi; but the central flattened portion, of greater or less extent, naked. Cirrhi 14–18-jointed; the joints short, the longest but little longer than broad. Terminal claw sharp and curved; penultimate joint with a short pointed opposing tubercle, which is not developed into a claw. Proximal pairs of pinnules at least twice as long as those succeeding. Ovaries short and rounded. Usually, when mature, without any trace of interradial plates (specimens from Arran, N. B., Strangford Lough, Ilfracombe, Kirkwall Bay, and generally round the coast); frequently, however, with groups, usually of three, perisomatic interradial plates in the spaces between the radial axillaries (specimens from Plymouth, Shetland, &c.). Colour crimson, scarlet, or mottled. Average size $4\frac{1}{2}$ inches from tip to tip of the arms.”

Antedon Milleri (J. Müller).

1821. *Comatula fimbriata*, Miller, Nat. Hist. of Crinoidea, p. 132 and frontispiece (but not *C. fimbriata*, Lamarck).

1849. *Comatula Milleri*, Johannes Müller, Ueber die Gattung *Comatula*, Lam., und ihre Arten.

“Perisom of the disk with scattered warts, supported by groups of diverging spicules. Centro-dorsal plate uniformly convex and entirely covered with dorsal cirrhi. Cirrhi of from fifteen

to eighteen joints; the longest of the joints about once and a half as long as broad. Terminal claw curved and acute; penultimate joint without a trace of an opposing process. Proximal pinnules greatly longer than those succeeding them. Ovaries narrow and long, extending over more than half the length of the pinnules. Groups of interradial plates occupying the spaces between the radial axillaries. Of a rich brown or reddish-tawny colour. Average size 11 inches from tip to tip of the arms. This fine species is somewhat intermediate in its characters between *C. rosacea* and *C. Eschrichtii* (J. Müller). Arran, N. B., Belfast (Prof. Wyville Thompson); mouth of the Mersey (Dr. Walker)."

Professor Wyville Thompson and Dr. Carpenter, during the investigations into the anatomy and physiology of this genus, on which they have for some time been engaged, have discovered the above species, which has hitherto been confounded with *A. rosaceus*. The preceding descriptions of the two species have been most kindly supplied to us for insertion by Professor Wyville Thompson; and we cannot sufficiently thank him for the liberality with which he has foregone all personal considerations in his readiness to aid in making the present paper a complete record of British Echinodermata.

The synonymy of the two species will be extremely difficult to unravel; and the names, which are here adopted, may, perhaps, hereafter have to be changed.

Antedon Sarsii (Düben & Koren).

1844. *Alecto Sarsii*, Von Düben & Koren, Öfversigt af Skandinaviens Echinodermmer, Kongl. Vetensk. Acad. Handl. p. 231, pl. 6. fig. 2.
 1860. *Comatula Sarsii*, Alder, Ann. Nat. Hist. ser. 3. vol. v. p. 74, pl. 5. fig. 2.
 1862. *Comatula Sarsii*, Dujardin & Hupé, Hist. Nat. des Zoophytes Echinodermes, p. 199.

Perisom of the disk naked or with scattered calcareous granules. Centro-dorsal plate conical, covered in every part with dorsal cirrhi. Cirrhi 13–20-jointed; the joints dice-box-formed, or of much smaller diameter in the centre than at the extremities, produced, the longest three or four times as long as broad; terminal claw acute; penultimate joint with a claw opposing the terminal claw, and nearly half its size. Three or four proximal pinnules greatly longer than those succeeding them. No interradial plates. Colour dusky brown.

This Norwegian species was first added to the British fauna by my late friend Mr. Barlee, who procured a single fragmentary specimen at Shetland, as recorded by Mr. Alder in 'the Annals of Natural History,' Feb. 1860. In 1861 we dredged it

living gregariously in about 90 fathoms water, forty miles east of the Whalsey Skerries, Shetland. It is, however, apparently extremely local, as, during two summers' dredging on the Shetland Haaf, it was only met with on this one occasion.

Antedon Celticus (Barrett).

1857. *Comatula Woodwardii*, Barrett, Ann. Nat. Hist. 2nd ser. vol. xix. p. 33, pl. 7. fig. 1 (*but not C. Woodwardii, E. Forbes, Palæont. Trans.* 1852, *Radiaria of the Crag*).

1857. *Comatula celtica*, Barrett, Ann. Nat. Hist. 2nd ser. vol. xx. p. 44.

Arms long and tapering, each ray bearing from sixty to seventy pinnæ on each side. The two pinnæ nearest the disk have each twenty-seven joints; the third, and those above it, eighteen. Each pinna is separated by two joints. The larger filiform processes (cirrhi) are composed of forty-five joints, gradually tapering, terminated by a claw which is larger than the joint next to it.

The above is a transcript of the late Mr. Barrett's description. Two specimens (the only examples as yet known) were dredged by Mr. M'Andrew in the Sound of Skye, in 25–40 fathoms, on a bottom of gravel and mud. This is a very fine *Antedon*, and very distinct from the other British species.

Order II. OPHIUROIDEA.

Body round or slightly pentagonal, depressed, having five or rarely six long arms inserted on, and proceeding from, the oral surface, but not continuous with the disk. Arms very slender and flexible, having a central vertebra-like framework, often encased in scales, and always bearing spines. Reptation by means of the flexible arms and their spines. Mouth inferior, central. Viscera not prolonged into the arms. No special anal opening, the digested matter being rejected through the oral aperture. Respiration effected by means of membranous tentacula issuing from the lower surface of the arms and the ciliated epithelium of the inner surface of the body and arms. No eyes. No pedicellariæ. No respiratory pores on the aboral surface. Madreporiform tubercle sometimes present, sometimes absent (in adult); when present, situated in one of the interradian spaces on the inferior or oral surface of the disk. Reproductive organs opening by ten apertures (twenty in some exotic genera) on the oral surface near the base of the arms.

Fam. I. *Astrophytonidæ*.

Arms generally ramose, but sometimes undivided; not plated with distinct series of scales. Two radiating rib-like projections

on the aboral surface of the disk, over the origin of each arm. No interradial plates (in the British genera) in the inferior interbrachial spaces.

Genus II. ASTROPHYTON, Linck.

Disk thick, pentagonal or round. Arms five, dichotomous from near the base, the branches again and again subdividing, until each arm terminates in innumerable very slender, filamentous branchlets. Under surface of arms with a transverse row of short spines to each joint, some of the spines provided with hook-formed processes. No interradial plates. Ovarian apertures ten, two in each interbrachial space. Oral plates bordered with spine-like papillæ, which increase in length towards the mouth.

Astrophyton Linckii, Müller & Troschel.

1733. *Astrophyton scutatum*, Linck, de Stellis marinis, *part.*, pl. 19. no. 48.

1766. *Asterias caput-Medusæ*, Linn. Syst. Nat. 1101, *part.*

1777. *Astrophyton arborescens*, Pennant, Brit. Zool. vol. iv. p. 67. no. 73
(but not of *Rondeletius* nor of Müller and Troschel).

1842. *Astrophyton Linckii*, Müller & Troschel, Syst. der Asteriden, p. 122.

Astrophyton Linckii is confined to the seas of Scandinavia and Shetland. We believe that it has not been procured in the latter locality since the publication of Forbes's work. In our dredgings to the east and north of the Shetland group, we have not seen a trace of the species; and the fishermen, to whom we showed Forbes's figure, were unacquainted with it. It would seem, therefore, that the species is only to be found on the western side of the islands. Dr. Charlton has kindly given us the following information respecting the *Astrophyton* which he procured:—"As far as I can recollect, my specimen of the *Astrophyton* was obtained on the north-western coast of Shetland; but, as it is twenty-nine years ago, I am not certain; for I did not get it myself, but it was procured by William Cameron, Esq., of Belmont, in Unst, who died about twenty-five years ago. The specimen was very large and fine, and in very perfect condition. In those days the fishermen knew it well; and I almost think, if my memory deceives me not, that I saw in 1852, twenty years after my first visit, a small specimen at the 'buidie' at Stennis, in Northmavine."

Genus III. ASTERONYX, Müller & Troschel.

Disk pentagonal, naked, without scales or granules; two radiating ribs over the origin of each arm. Arms long and slender, undivided, without scales, convex above, flat beneath. Spines in transverse rows, the larger furnished with hooked processes. No interradial plates. Oral plates bordered with papil-

lary spines on the margin, increasing in length and size towards the mouth, being most developed on the maxillary face. Ovarian apertures ten. A madreporiform tubercle in one of the interradial spaces on the oral surface.

Asteronyx Lovéni, Müller & Troschel.

1842. *Asteronyx Lovéni*, Müller & Troschel, Syst. der Asteriden, p. 296.
 1861. *Asteronyx Lovéni*, Stewart, Ann. Nat. Hist. vol. viii. p. 77 and fig.
 1861. *Asteronyx Lovéni*, Sars, Oversigt af Norges Echinodermer, p. 5, pl. 1. figs. 1-5.
 1862. *Asteronyx Lovéni*, Dujardin & Hupé, Hist. Nat. des Zoophytes Echinodermes, p. 296.

Disk pentagonal, covered, as are also the arms, by a naked skin, wholly devoid of scales or granules; a pair of flat cartilaginous radiating ribs on the dorsal surface over the base of each arm. Arms very long (greater to lesser radius as about 18 to 1), convex above, flat beneath. Spines very short, originating from calcareous elevated processes; the number of spines in each transverse row (contrary to what is the rule among the Ophiuridæ) is less at the base of the arms than at some little distance from the margin of the disk; the greatest number of spines in any transverse row is twelve; one spine in each row is much longer than the rest, and more than equal in length to half the breadth of the arm; this spine is inclined inwards and covered with a smooth skin, but towards the apex it is furnished with several hook-formed processes. There are no papillary spines over the tentacular pores. The oral aperture is bounded by five strong calcareous bars, one of which forms the inner margin of each interradial space.

A single specimen is all that has as yet been found to prove the existence of this fine Norwegian Echinoderm in the British seas. That specimen, which is a fine example, measuring in its lesser diameter $1\frac{5}{8}$ inch, and in its greater diameter 2 feet, is now preserved in the British Museum. It was procured from Loch Torridon, in Rosshire, in the summer of 1859, by Mr. John A. Stewart, who took it from the deep-sea lines, which had been set in a part of the loch 9 fathoms deep, where the bottom was rocky. The occurrence of the species in the Laminarian Zone is somewhat remarkable, since on the Norwegian coast, like the *Astrophytonidæ* in general, it inhabits the deep sea in from 50 to 150 fathoms.

Fam. II. Ophiuridæ.

Arms always simple, and (in British genera) always encased by four series of scales, one dorsal, one ventral, and two lateral. No radiating ribs on the dorsal surface of the disk over the origin of the arms; generally two radiating scales take their place, but

in some genera these are wholly absent. Interradial plates of greater or less size always present.

Genus IV. OPHIOTHRIX, Müller & Troschel, 1840.

Disk not scaly, covered with more or less developed spines and spinose tubercles, and having two very large, triangular radiating scales above the origin of the arms. Arms simple, scaly; superior scales imbricated; lateral carinated, bearing long, elegantly serrated, spreading spines. Interradial plates very small. Oral plates with plain sides.

Ophiothrix fragilis (O. F. Müller).

1789. *Asterias fragilis*, Müller, Zool. Dan. vol. iii. p. 28, pl. 98.

1841. *Ophiocoma rosula*, Forbes, Brit. Starfishes, p. 60.

1842. *Ophiothrix fragilis*, Müll. & Trosch. Syst. der Asteriden, p. 110, pl. 9. fig. 2.

1845. *Ophiothrix rosula*, Forbes, Trans. Linn. Soc. vol. xix. p. 151.

1841. *Ophiocoma minuta*, Forbes, Brit. Starfishes, p. 65 (*the young*).

Found all round our coast, and ranging from the Mediterranean to Norway and Finmark.

Genus V. AMPHIURA, Forbes, 1842.

Disk scaly, generally having six larger scales in the form of a rosette at the centre; scales smooth, or bearing scattered small spines; two, usually narrow, radiating scales above the origin of the arms. Arms simple, scaly; lateral scales carinated, bearing simple (or rarely anchor-headed) spreading spines. Interradial plates small. Oral plates with plain sides.

Amphiura filiformis (O. F. Müller).

1841. *Ophiocoma filiformis*, Forbes, Brit. Starfishes, p. 40.

1857. *Amphiura filiformis*, Sars, Bidrag til Kundsk. om Middlehavets Litt. Fauna, p. 84.

1858. *Amphiura filiformis*, Lütken, Addit. ad hist. Ophiuridarum, Förste Afdeling, p. 56, pl. 2. fig. 11.

Disk covered with small scales, not having any larger than the rest in the centre; radiating scales narrow, subparallel; under surface of disk membranous, and nearly devoid of scaly covering. Arms extremely long and very slender: spines 5-7 on each lateral plate; one of them anchor-headed. No papillary spines over the tentacular pores.

Shetland; Firth of Clyde; Durham and Northumberland coasts (Norman). "Killary and other marine loughs of Connemara" (Forbes).

Amphiura Chiajii, Forbes.

1841. *Ophiocoma punctata*, Forbes, Brit. Starfishes, p. 37 (*the young?*).

1845. *Amphiura Chiajii*, Forbes, Trans. Linn. Soc. vol. xix. p. 151, pl. 14. figs. 14-18.
 1857. *Amphiura Chiajii*, Sars, Bidrag til Kundsk. om Middlehavets Littoral-Fauna, p. 86, pl. 1. figs. 8-10.
 1858. *Amphiura Chiagei*, Lütken, Addit. ad hist. Ophiuridarum, Förste Afdeling, p. 57, pl. 2. fig. 12.
 1862. *Amphiura Chiajii*, Dujardin & Hupé, Histoire Naturelle des Zoo-phytes Echinodermes, p. 253.

Disk covered with small scales, and having a central and five surrounding scales in the form of a rosette, larger than the rest; radiating scales triangular, diverging; under surface of disk not membranous, closely covered with scales of similar character to those of the upper surface. Arms extremely long and very slender; spines 4-6 (rarely 7) on each lateral plate, all of them simple. Two papillary spines to each tentacular pore.

This species ranges from the Ægean to the Scandinavian seas, and on our own coast is far more common than either *A. filiformis* or *A. brachiata*, with both of which, however, it has frequently been confounded. Like *A. filiformis*, it inhabits mud in the coralline zone; and not unfrequently the two species are found in company. Judging from Forbes's description and figure, we are inclined to regard his *Ophiocoma punctata* as the young of the present species. Forbes's type specimen was presented to the British Museum, but would appear to have been lost. The tablet which we found to be marked "*Ophiocoma punctata*," and which bears on its back a little label in Forbes's own handwriting, has mounted upon it, instead of the type *Ophiocoma punctata*, a specimen of *Ophiocoma nigra*! Sir John Dalyell ('Powers of the Creator Displayed,' &c., vol. i. 1851, p. 118, pl. 29) has also described and figured *Ophiocoma nigra* under the name of *Ophiura punctata*. It is highly probable that he procured his erroneous specific name from an examination of the misleading specimen in the British Museum. It need scarcely be added that Forbes's obscure species bears not the slightest resemblance to *O. nigra*, with which it has thus been confused.

The name *O. punctata* has precedence in point of date over *A. Chiajii*; but as there is some degree of doubt respecting the identity of the former with the latter, as both were described by the same author, and as *A. Chiajii* has been generally adopted, it seems desirable that that name should be permanently retained for the species.

Shetland; Durham and Northumberland coasts; Clyde (Norman); Inverary and Oban (Mr. D. Robertson); "Hebrides" (Forbes).

A. Chiajii may at once be distinguished from *A. filiformis* by the absence of anchor-headed spines, and by the presence of the

larger scales at the centre of the disk, as well as by the other characters given above. From *A. brachiata* it may be known by the six radiating disk-scales and the less numerous arm-spines.

Amphiura brachiata (Montagu).

1841. *Ophiocoma brachiata*, Forbes, Brit. Starfishes, p. 45.
 1842. *Ophiolepis brachiata*, Müll. & Troschel, Syst. der Asteriden, p. 96.
 1857. *Amphiura Neapolitana*, Sars, Bid. Middlehavets Litt. Fauna, p. 91, pl. 1. figs. 11-15.
 1859. *Amphiura brachiata* and *A. Neapolitana*, Lütken, Addit. ad hist. Ophiuridarum, Anden Afdeling, p. 114.

Disk covered with small imbricated scales, which assume a spinose form at the margins, where they stand out from the surface; radiating scales triangular, diverging, widest at their centre, and having a furrow across the base; under surface of disk closely covered with minute scales. Arms extremely long and very slender; spines 8-12, short, thick, and of nearly equal length, all simple. Two papillary spines at each tentacular pore; the outer, however, is only present at the base of the arms. Upper arm-plates transversely oblong; lower quadrate, with two longitudinal furrows.

Sars's description of *Amphiura Neapolitana* agrees in every respect with our British species, except that in the specimens which I have examined the radiating plates have no granulations on their surface; but this can scarcely be regarded by itself as constituting a specific character. *Amphiura brachiata* has thus a range from the Mediterranean to the Firth of Clyde, whence I have had the opportunity of examining a specimen taken by Mr. D. Robertson on the shores of Little Cumbræ. The other recorded British habitats are Salcombe Bay (Montagu), and the coasts of Down and Antrim (Thompson).

Amphiura elegans (Leach).

1815. *Ophiura elegans*, Leach, Zool. Miscell. vol. ii. p. 57.
 1823. *Asterias squamata*, Delle Chiaje, Mem. sulla storia e anatomia degli animali del regno di Napoli, pl. 34. fig. 1.
 1835. *Ophiura neglecta*, Johnston, Mag. Nat. Hist. vol. viii. p. 467.
 1841. *Ophiocoma neglecta*, Forbes, Brit. Starfishes, p. 30.
 1842. *Ophiolepis squamata*, Müller & Troschel, Syst. der Asteriden, p. 94.
 1845. *Amphiura neglecta*, Forbes, Trans. Linn. Soc. vol. xix. p. 150.
 1861. *Amphiura squamata*, Sars, Oversigt af Norges Echinodermter, p. 21.

Amphiura elegans ranges from the Mediterranean and Ægean seas to Scandinavia. It is found all round our own coasts, under stones between tide-marks, and is also taken, though rarely, with the dredge.

Amphiura Ballii (Thompson).

1840. *Ophiocoma Ballii*, Thompson, Ann. Nat. Hist. vol. v. p. 99.

1841. *Ophiocoma Goodsiri*, Forbes, Brit. Starfishes, p. 57.
 1842. *Ophiolepis Ballii* and *Goodsiri*, Müller & Troschel, Syst. der Asteriden, p. 97.
 1848. *Ophiopholis Ballii* and *Goodsiri*, Gray, Brit. Mus. Cat. Brit. Radiata, p. 25.
 1857. *Amphiura Ballii*, Sars, Middlehavets Littoral Fauna, p. 99.
 1859. *Ophiactis Ballii*, Lütken, Addit. ad hist. Ophiuridarum, Anden Afdeling, p. 126.
 1861. *Amphiura Ballii*, Sars, Oversigt af Norges Echinodermer, pp. 17 & 20.

Disk lobed, covered with small imbricated scales, frequently produced at their apices into short spines, which are more numerous and longer towards the margin and on the under side of the disk; radiating scales triangular, diverging, their length equal to one-third the breadth of the disk. Arms of moderate length, their upper plates obtusely triangular, with the basal angle rounded; lower plates somewhat heart-shaped, with the basal angle rounded; spines 4-5, red, the two upper about equal to the breadth of the arm in length. Colour of disk yellowish or red, often mottled with these two colours; arms banded with red.

I have at length been able to determine positively what I had long suspected, that the two Starfishes described by Forbes under the names *O. Ballii* and *O. Goodsiri* are one and the same species. Through the kindness of Dr. E. Percival Wright, I have had the opportunity of examining the fragments which are preserved in the Dublin Museum of the types of Thompson's *O. Ballii*; while *O. Goodsiri* I have been enabled to satisfactorily identify through specimens which were named by Prof. Forbes, and which are preserved in the collection of Mr. Alder. I am unable to discover any structural difference between the two so-called species.

Amphiura Ballii inhabits the Scandinavian and British Seas. In the latter it has been taken at Shetland and off the coasts of Durham and Northumberland (Norman); Moray Firth (Mr. T. Edward); Dublin (Dr. Ball). It lives on hard ground, in deep water, and has a peculiar habit, delighting to nestle in hollows and crevices of stones, squeezing its disk and twisting its arms so as to conform to all the irregularities of the surface to which it attaches itself.

Genus VI. OPHIOPELTIS, Düben & Koren, 1846.

Disk membranous, and altogether naked, wholly devoid of scales and spines, except that there are two elongated plates over the origin of each arm. Arms simple, scaly, without any soft integument; lateral scales bearing spreading spines,

one of which is anchor-headed. Oral plates with papilliferous margins. No papillary spines at the tentacular pores.

Ophiopeltis securigera, Düben & Koren.

1846. *Ophiopeltis securigera*, Von Düben & Koren, Översigt af Scandinaviens Echinodermer, p. 236, pl. 6. figs. 3-6.

1861. *Ophiopeltis securigera*, Sars, Oversigt af Norges Echinodermer, p. 14.

Disk having the radiating scales long, narrow, and parallel.

Arms extremely long and very slender; upper scales triangular, lower cordate; lateral scales bearing three spines, of which the upper and lower are simple; but the middle is much swollen in the centre, and apically produced into an anchor- or, rather, axe-formed semicircular head, having a jagged edge. Disk greyish; arms bright orange.

A single specimen of this most interesting addition to our fauna was dredged in 1861, by Mr. Jeffreys and myself, on the haddock-ground about six miles to the north of the Whalsey Lighthouse, Shetland, in 40-50 fathoms. The species had, previously to the date just mentioned, been inserted as British in the "List of British Marine Invertebrate Fauna" published by the British Association; but, as far as we can learn, at that time it had not been taken in our seas; and it would seem that the name was inserted by mistake for *A. Chiajii*.

The arms of these species are more flexible than those of any other Echinoderm with which we are acquainted. They are commonly coiled upon themselves in many complete circles.

Genus VII. OPHIOCOMA, Agassiz, 1834.

Disk uniformly granular; no radiating plates over the base of the arms. Arms simple, covered with imbricated scales; spines of lateral plates spreading, very long, and serrated at the tips. Oral plates with papilliferous margins, the papillæ long and erect. One or two valvular scales at each tentacular pore.

Ophiocoma nigra (O. F. Müller).

1789. *Asterias nigra*, Müller, Zool. Dan. vol. iii. p. 20, pl. 93. figs. 1-4.

1828. *Ophiura granulata*, Fleming, British Animals, p. 488.

British and Scandinavian. Found all round our coasts, though somewhat local.

Genus VIII. OPHIOPHOLIS, Müller & Troschel, 1840.

Disk ornamented with rosulated scales, between which the surface is covered with very numerous close-set tubercles; no radiating plates over the base of the arms. Arms covered with

transversely oblong scales, which are separated from each other by transverse rows of tubercles; lateral plates bearing rather short, spreading, blunt, simple spines. Oral plates margined with a few flattened papillæ. One or two valvular plates over the tentacular pores.

Ophiopholis aculeata (O. F. Müller).

1776. *Asterias aculeata*, Müller, Zool. Dan. Prod. p. 235. no. 2841; and 1789. Zool. Dan. vol. iii. p. 29, pl. 99. figs. 1-3.
 1828. *Ophiura bellis*, Fleming, British Animals, p. 488.
 1842. *Ophiolepis scolopendrica*, Müller & Troschel, Syst. der Asteriden, p. 96.
 1858. *Ophiopholis aculeata*, Lütken, Addit. ad hist. Ophiuridarum, Förste Afdeling, p. 60, pl. 2. figs. 16, 17.

Found all round our coast, but scarcer in the south. To the north it ranges throughout the Scandinavian seas, and occurs also in Greenland and Western America.

Genus IX. OPHIURA, Lamarck.

Ophiura, Lamarck, 1814; *Ophiolepis* (partly), Müller & Troschel, 1840.

Disk covered with smooth scales, of which two, larger than the rest and triangular, are situated over the inserted base of each arm. Arms simple, scaly; spines three, appressed and articulated to the distal margin of the overlapping side-plates. Interradial plates large, shield- or fiddle-shaped, produced into the interbrachial spaces. Clasping-scales at the junction of the arms with the disk furnished with spines or papillæ on their edge. Oral plates with papilliferous margins.

Ophiura lacertosa (Pennant).

1733. *Stella lacertosa*, Linck, De Stellis marinis, p. 47, pl. 2. fig. 4.
 1777. *Asterias lacertosa*, Pennant, Brit. Zool. vol. iv. p. 63.
 1805. *Asterias ciliata*, Retzius, Diss. sistens species cognitæ Asteriarum, p. 29.
 1816. *Ophiura texturata*, Lamarck, Hist. Anim. sans Vert. vol. ii. p. 542.
 1842. *Ophiolepis ciliata*, Müll. & Troschel, Syst. der Asteriden, p. 91.

Interradial plates fiddle-shaped, much longer than broad, exceeding in length the space between their apices and the margin of the disk. Lateral ray-plates of the first few joints not meeting each other on the under surface of the arms, thus leaving a hollow pore in the centre between each inferior arm-plate. Dorsal arm-plates transversely oblong; ventral arm-plates lenticular. Spines not equalling in length the plates to which they are attached. Clasping-scales with 20-30 long and slender marginal spines. Three or four papilli-form spines at each tentacular pore.

Diameter of disk 1 inch.

All round our coasts, and ranging from the Mediterranean to

Scandinavia. It has also been recorded from Western America ; but possibly an allied species may have been there mistaken for it.

Ophiura Sarsii, Lütken.

1854. *Ophiura Sarsii*, Lütken, Videnskabelige Meddelelser fra der Naturhistoriske Forening i Kjöbenhavn, p. 95.
 1858. *Ophiura Sarsii*, Lütken, Addit. ad hist. Ophiuridarum, Förste Afdeling, p. 42, pl. 1. figs. 3, 4.
 1862. *Ophiura Sarsii*, Dujardin & Hupé, Hist. Nat. des Zoophytes Echinodermes, p. 250.

Nearly allied to, and as large as, *O. lacertosa*. Interradial plates shield-shaped, with straight sides, their length but slightly exceeding the breadth, and not equalling the space between their apices and the margin of the disk. Lateral arm-plates coalescing on the under surface of the arms, thus leaving no pore. Dorsal arm-plates transversely oblong ; ventral arm-plates lenticular (broader than in the last species). Spines exceeding the length of the lateral arm-plates. Two papilli-form spines at each tentacular pore. Claspings-scales with about fifteen short flattened spines.

Diameter of disk nearly 1 inch.

Dredged by Messrs. Jeffreys, Waller, and myself at Shetland in 1861, and again in 1863, in 80–100 fathoms. It is an Arctic species, occurring throughout the Scandinavian seas and in Greenland.

Ophiura albida, Forbes.

Ophiura albida, Forbes, British Starfishes, p. 27.

Interradial plates shield-shaped, with straight sides, a little longer than broad, not equalling the distance between their apices and the margin of the disk. No pores. Dorsal arm-plates fan-shaped ; ventral arm-plates small, somewhat hexagonal, widely separated from each other by the juncture between them of the broad side-plates. Spines shorter than the lateral plates to which they are articulated. One papilli-form spine at each tentacular pore. Claspings-scales with 10–15 short spines. Colour rosy, with the radiating plates over the base of the arms white.

Diameter of disk $\frac{5}{12}$ ths of an inch.

Dredged on every part of our coast, and found both in the Mediterranean and in Scandinavia.

Ophiura affinis, Lütken.

1858. *Ophiura affinis*, Lütken, Addit. ad hist. Ophiuridarum, Förste Afdeling, p. 45, pl. 2. fig. 10.
 1862. *Ophiura affinis*, Dujardin & Hupé, Hist. Nat. des Zoophytes Echinodermes, p. 250.

1863. *Ophiura Normani*, Hodge, Transactions Tyneside Naturalists' Field-Club, vol. v. p. 296, pl. 16. figs. 1-3.

Disk rosulated, having a central scale surrounded by five, then five outside these again, the interspaces of these larger scales filled up with small round scales. Interradial plates fiddle-shaped, longer than broad, not equalling in length the space between their apices and the margin of the disk. Arms long, slender, and very flexible. No pores as in *O. lacertosa*. Dorsal arm-scales transversely oblong; ventral lenticular, small, separated from each other by the junction of the lateral arm-plates. Spines as long as, or longer than, the lateral plates. One papilliform spine over each tentacular pore. Claspingscales with about ten spines, and a circlet of spines meeting over the insertion of the arm.

Diameter of disk $\frac{3}{12}$ ths of an inch.

It is probable that this pretty little species will prove to be not unfrequent in our seas. We have dredged it in 20-40 fathoms in the Firth of Clyde, at Shetland, and off the Northumberland coast; and Mr. Hodge has procured it at Seaham, in the county of Durham. Mr. Hodge has described this species as British, under the name of *Ophiura Normani*, which must, however, yield to the prior appellation of Lütken, which we have here adopted. The type specimens were from the coast of Norway.

Ophiura squamosa, Lütken.

1854. *Ophiura squamosa*, Lütken, Videnskabelige Meddelelser fra der Naturhistoriske Forening i Kjöbenhavn, p. 95.

1857. *Ophiura squamosa*, Lütken, Oversigt over Grönlands Echinodermata, p. 50.

1858. *Ophiura squamosa*, Lütken, Addit. ad hist. Ophiuridarum, Förste Afdeling, p. 46, pl. 1. fig. 7.

1862. *Ophiura squamosa*, Dujardin & Hupé, Hist. Nat. des Zoophytes Echinodermes, p. 251.

Disk entirely covered with small imbricated scales of equal or nearly equal size. Interradial plates triangular, as broad as long, shorter than the distance from their apices to the margin of the disk. No pores. Dorsal arm-plates fan-shaped; ventral small, cordate, and emarginate at the apex. The longest of the spines equals the length of the lateral plates. One papillary spine to each tentacular pore. Claspingscales with very few and short marginal spines.

Diameter of disk $\frac{2}{12}$ ths of an inch.

This small *Ophiura* has been found abroad in Norway, Fimmark, and Greenland. All the British specimens that we have hitherto seen have been taken on the east coast. Mr. Alder and the author have procured it off Cullercoats; Mr. Hodge at Sea-

ham; and Mr. Edward has sent it to us from Banff. It is an inhabitant of the coralline zone.

Order III. ASTEROIDEA.

Body stellate or angular, produced into five or more, more or less elongated lobes or hollow arms, or rather rays, which are perfectly continuous with the disk, and contain caecal prolongations of the viscera. These rays throughout the entire length of the oral surface are centrally hollowed into channels, called ambulacra, from which are protruded two or four rows of suckers. Reptation by means of these suckers and of others which are situated on the disk. Skeleton composed of numerous calcareous plates, variable in number and size, and supporting a coriaceous envelope which is pierced on the aboral surface by pores for the protrusion of respiratory tentacles, and bearing for the most part numerous spines. These spines are often collected together in groups, supported on pedestal-like columns, which columns with their accompanying spines are called paxillæ. Mouth inferior, central, sometimes also serving as the vent; a special anal opening is, however, more generally present, on the centre of the aboral surface. Respiration complicated, being partly effected by means of the aboral respiratory tentacles, partly by the ambulacral tentacles, and partly by the entire ciliated epithelium of the surface of the body. A madreporiform tubercle—a filter for the admission of water—on the aboral surface of the disk more or less eccentrically placed. Eyes situated at the extremity of the arms. With or without one or two kinds of pincer-like pedicellariæ, formed of two opposing calcareous pieces. Sexes distinct. Ovaries ten; their special openings, when present (which is not always the case), on the aboral surface, between the origins of the arms.

Fam. I. Astropectinidæ.

No special anal opening. Two rows of ambulacral tentacula.

Genus X. ASTROPECTEN, Linck.

[*Astropecten*, Linck, 1733, and Gray, 1841; *Stellaria*, Nardo, 1831 (nom. usit.); *Asterias* (restricted), Agassiz, 1837.]

Disk, together with the five long rays, flat above, and covered in every part by closely aggregated paxillæ. Two rows of lateral plates, the upper covered with granules, the lower clothed with spines, which are shorter on the inferior portion, and gradually increase in length towards the upper margin, where they are long. Suckers biserial. No anus. Madreporiform tubercle near the margin of the disk. No pedicellariæ. Respiratory pores very numerous.

Astropecten irregularis (Pennant).

1776. *Asterias aurantiaca*, Müller, Zool. Dan. Prod. p. 234, no. 2831 (*but not of Linnæus*).
1777. *Asterias irregularis*, Pennant, Brit. Zool. vol. iv. p. 61. no. 47.
1841. *Asterias aurantiaca*, Forbes, Brit. Starfishes, p. 130.
1844. *Astropecten Mülleri*, Müller & Troschel, Archiv für Naturgeschichte, vol. x. p. 181.
1844. *Astropecten echinulatus*, Müller & Troschel, Archiv für Naturgeschichte, vol. x. p. 181 (*fide Sars*).

Marginal plates 20–40. Greater to lesser radius as 4–6 to 1. Spines of the under surface flattened, spatulate, widening at the tips. Each inferior marginal plate bears one transverse row of spines, which exceed the rest in length, and themselves gradually increase in size towards the superior margin of the plates.

Common all round the coasts of Great Britain, and found in Scandinavia. My largest specimen measures 6 inches in diameter.

Astropecten acicularis, n. sp.

Marginal plates 20–23. Greater to lesser radius as 3–4 to 1. Spines of the under surface aciculate (not spatulate or widening at the tips), and only the large spines of the inferior marginal plates slightly flattened. Inferior marginal plates with two transverse rows of larger spines, which gradually increase in length towards the superior margin of the plates. 2 inches in diameter, from tip to tip of the rays.

This species resembles the last closely in every particular with respect to the aboral surface, but differs greatly in the character of the spiny armature of the inferior portion of the body. The rays are rather shorter than is usual in *A. irregularis*. The three innermost spines of the adambulacral plates (of which the central is the longest, and curved, and all are cylindrical) are projected over the ambulacra. All the spines of the under surface are slender and pointed, and thus differ widely from the flattened, widening spines of *A. irregularis*. The inferior marginal plates, instead of being covered, as in *A. irregularis*, with a cushion of closely appressed, short, broadly flattened spines, and a single transverse row of much larger and conspicuous spines (generally, though not always, greatly flattened), are furnished with cylindrical slender spines of various lengths, from among which the chief row does not stand out so conspicuously.

Astropecten acicularis was dredged by me in 1861, in company with Messrs. Jeffreys and Waller, on the Outer Haaf at Shetland, living gregariously in 80–100 fathoms. It does not appear to agree with any of the numerous species of this genus which have hitherto been described.

Genus XI. LUIDIA, Forbes.

[*Luidia*, Forbes, 1839; *Hemicnemis*, Müller & Troschel, 1840.]

Rays 5-7, very long, narrow at the base, and of nearly equal diameter throughout, together with the disk flat above, and covered in every part by closely aggregated paxillæ. A single row of lateral ray-plates, which, together with the whole under surface, are covered with slender, acute spines. Suckers biserial. No anus. Madreporiform tubercle near the margin of the disk. A single row of pedicellariæ alternating with pores in a groove on the exterior side of the adambulacral plates. Respiratory pores very numerous.

It has always hitherto been stated that this genus was unprovided with pedicellariæ. Such a statement, however, is incorrect. These remarkable organs are present, and hold, moreover, an isolated and peculiar position, which, I believe, is without a parallel among other Echinodermata. If the oral surface of a *Luidia* be carefully examined, there will be found on either side of the ambulacra, and midway between the ambulacra and the margin of the rays, or, in other words, exterior to the adambulacral plates, a longitudinal row of pores situated in a sulcus; and, crowning each of the calcareous rib-like plates which separate these pores from each other, there will be observed a single, erect, triangular, pincer-formed pedicellaria. It is not a little remarkable that these organs, which are by no means inconspicuous, should have apparently wholly escaped the observations of Von Düben and Koren (who give a carefully executed figure of a section of the under surface of a ray of *Luidia Sarsii*) and of Sars, who, in his 'Middlehavets Littoral Fauna,' draws the specific character in our two species from the number and form of the spines of the adambulacral plates, which, as we have seen, are immediately adjacent to the avenues in which the pedicellariæ are situated. The pedicellariæ themselves are organs which we find to afford valuable specific distinction in this genus. In *Luidia Savignii* they are short, broad, and tumid—in fact, in the form of a nearly equilateral and equiangular triangle; while in *Luidia Sarsii* they are much more elongated, narrow, and not tumid, and have the outline of a somewhat produced isosceles triangle. The peculiar position which the pedicellariæ occupy in this genus will, we doubt not, form almost necessarily a ground of argument with those naturalists who shall hereafter discuss the nature of the functions which these anomalous and peculiar appendages of the Echinodermata discharge.

Luidia Savignii (Audouin).

1828. *Asterias Savignii*, Audouin; Savigny, Histoire de l'Égypte, pl. iii. (1809); description (1828), vol. xxiii. p. 9.

1839. *Luidia fragilissima*, Forbes, Mem. Wern. Soc. vol. viii. p. 123 (partly), but not woodcut.
 1841. *Luidia fragilissima*, Forbes, Brit. Starfishes, p. 135 and woodcut.
 1842. *Luidia Savignii*, Müller & Troschel, Syst. der Asteriden, p. 77.
 1857. *Luidia Savignii*, Sars, Middlehavets Littoral Fauna, p. 100.

Seven-rayed^{*}, 1–2 feet in diameter. Spines bordering on the ambulacra in two rows, the inner slightly arched, the outer nearly twice as stout and long as the inner. Exterior to these a row of broadly triangular tumid pedicellariæ and respiratory pores alternating with each other.

Luidia Savignii is found in the Mediterranean and thence to the seas of Scandinavia. On our own coasts it seems widely distributed, occurring here and there all round Great Britain. We have either taken or seen it from Polperro (Mr. Laughlin); Clyde, Hebrides, and Shetland (*A. M. N.*); and Redcar, in Yorkshire (Mr. Ferguson). Other habitats will be found recorded in Professor Forbes's work.

Most deservedly is this species named after M. Savigny. His figure in the 'Histoire de l'Égypte' is a marvellous example of the perfection to which the engraving of objects of natural history can be carried. It is a masterpiece. Drawn life-size on a folio plate, the minutest details—each paxilla and each spine—have been elaborated with wonderful skill; yet nothing is overdrawn or exaggerated. Nature has been, as it were, photographed—and that, too, before photography was discovered—by the artist on his plate.

Luidia Sarsii, Düben & Koren.

1839. *Luidia fragilissima*, Forbes, Mem. Wern. Soc. vol. viii. p. 123 (partly) and woodcut.
 1841. *Luidia fragilissima*, Forbes, Brit. Starfishes, p. 135 (partly), but not woodcut.
 1844. *Luidia Sarsii*, Düben & Koren, Oversigt af Kong. Vet. Akad. Förh. p. 113.
 1844. *Luidia Savignii*, Düben & Koren, Skand. Echin. p. 254, pl. viii. figs. 23, 24.
 1857. *Luidia Sarsii*, Sars, Middlehavets Littoral Fauna, p. 102.

Five-rayed, rarely exceeding 6 inches in diameter. Spines bordering on the ambulacra in three rows, the inner much curved and flattened at the tip; the middle a little longer, thicker, and straighter; the outer straight, equalling the inner row in length. Exterior to these a row of narrowly triangular pedicellariæ and respiratory pores alternating with each other.

Apparently of more northern range than the last. It has been met with in Norway; and has been taken by myself in Shetland, and traced thence along the eastern coast of Great Britain as far south as Yorkshire. There is no record of a western or southern

locality, though there can be little doubt that it will be found hereafter among the Hebrides.

Fam. II. Solastridæ.

A special anal opening, situated in the centre of the aboral disk. Two rows of ambulacral tentacula.

Genus XII. ARCHASTER, Müller & Troschel, 1840.

Disk; together with the five moderately long rays, flat above, and covered in every part by closely aggregated paxillæ. Two rows of large lateral plates, the upper covered with large granules or mamillary spines; the lower covered with closely appressed, short, papillose spines. Suckers biserial. Anus central. Pincer-formed pedicellariæ present. Respiratory pores isolated among the paxillæ.

Archaster Parelii (Düben & Koren).

1768. *Asterias aurantiaca*, var., Parelius, Kongelige Norske Videnskabers Selskabs Skrifter, Act. Nidross. iv. p. 325, pl. xiv. figs. 3, 4.

1844. *Astropecten Parelii*, Düben & Koren, Skand. Echin. p. 247, pl. vii. figs. 14-16.

1861. *Archaster Parelii*, Sars, Oversigt af Norges Echinodermer, p. 35.

Greater to lesser radius as 3 to 1. Aboral surface entirely covered with closely aggregated paxillæ. Each of these paxillæ consists of a pillar, widening above and supporting about twenty-five (15-30) mamillary spines of different sizes. Madreporiform tubercle nearer to the centre than to the margin of the disk, minute, not so large as one of the paxillæ. Lateral ray-plates thirty, oblong, entirely covered with mamillary spines of the same kind but larger than those of the paxillæ, nearly a hundred on each plate. Oral surface entirely covered with closely packed short papillose spines. The inferior lateral plates are most beautiful cushions of closely aggregated, appressed papillary spines, each plate having a central row of 3-5 rather larger and more conspicuous spines, which, however, like all the rest, are closely appressed to the surface. Indeed there are no spines projecting conspicuously beyond the rest from any part of the body. The spines of the ambulacral plates are so numerous that, spreading from them in all directions, they nearly choke up the ambulacral channels. Greater diameter not quite 4 inches.

A single specimen of *Archaster Parelii* was dredged by Messrs. Jeffreys and Waller, during the past summer, on the Outer Haaf, off Shetland, in 100 fathoms. It is a very interesting addition to our list of British Echinodermata. I have removed this species from the genus *Astropecten*, in which it had been

placed by Düben and Koren, and placed it in *Archaster* on the authority of Professor Sars. I am unable myself to vouch for the correctness of this transfer, as I have been unwilling to injure the only British specimen in order to ascertain the presence of those organs (the anal aperture and pedicellariæ) which separate the genus *Archaster* from *Astropecten*.

Genus XIII. PALMIPES, Linck.

[*Palmipes*, Linck. 1733, and Agassiz, 1837; *Asteriscus*, Müll. & Trosch. (partly), 1840.]

Body pentagonal, extremely thin and flat; sides greatly produced beyond the central cavity in the form of a thin lamella. Surface furnished with fascicles of spines (not paxillæ). These fascicles are arranged, especially on the under surface, in radiating lines. Each adambulacral plate bears about five spines, the central of which is the longest. The body and rays have an acute edge unprovided with marginal plates or spines. Suckers biserial. Anus subcentral. No pedicellariæ. Madreporiform tubercle towards the margin of the central cavity, but at some distance from the edge of the disk.

This genus appears to differ totally in structure from all other Starfishes. Its greatly flattened disk and rays are built up of an immense number of battledore-shaped calcareous plates, which are most interesting objects for the microscope, on account of the elegance of their form and the beauty of their structure. They are everywhere perforated, except where strengthened by delicate rib-like processes which pass from the shaft to the distal extremity of the plate. These plates are laid one over another, both on the oral and aboral surface, like the roofing of a house thatched with palm-leaves; and the shafts of the plates are buried between the plates of the opposite surface of the disk. Thus the whole structure is built up; and it is the peculiarly fragile character of these calcareous plates which makes this Starfish so very brittle when preserved. The fascicles of spines of the surface of *Palmipes* are attached to the calcareous plates, each plate bearing a transverse row of spines across its rounded distal extremity. I am not aware that the unique character of the skeleton of this Starfish has previously been noticed.

Palmipes placenta (Pennant).

1777. *Asterias placenta*, Pennant, Brit. Zool. vol. iv. p. 62, no. 50, pl. xxxi. fig. 59 A.

1783. *Asterias membranacea*, Retzius, Kong. Vet. Akad. Nya Handl. vol. iv. p. 238.

1839. *Palmipes membranaceus*, Forbes, Mem. Wern. Soc. vol. viii. p. 119, pl. iii. fig. 3.

Palmipes placenta is a southern species, found in the Mediter-

anean and on the southern and western shores of our island, attaining its northern limit at Shetland, where we dredged it in 1861 and again in 1863, and descending the eastern coast as far as the Moray Firth. It appears to be wholly absent from the rest of the eastern side of Great Britain.

Genus XIV. ASTERINA, Nardo.

[*Asterina*, Nardo, 1834. *Asteriscus*, Müll. & Trosch. (partly), 1840.].

Body convex above, or even gibbous, flat beneath; rays very short; whole form somewhat pentagonal. Margin of disk and arms sharp-edged, bordered with short spines, but having no distinct marginal plates. Surface above and below bearing numerous fascicles of short spines; 2-4 spines in each fascicle. Respiratory pores very numerous and conspicuous. Suckers biserial. Anus subcentral. Madreporiform tubercle midway between the centre and the margin of the disk.

Müller and Troschel formed a genus *Asteriscus* for the reception of *Palmipes placenta* and *Asterina gibbosa*, and thus not only unwarrantably used a genus of their own in preference to adopting and enlarging, if necessary, the generic character of one of those previously described, but united two forms which differ in the character of their whole structure from each other.

Asterina gibbosa (Pennant).

1777. *Asterias gibbosa*, Pennant, Brit. Zool. vol. iv. p. 62, no. 49.

1805. *Asterias verruculenta*, Retzius, Dissert. sistens species cog. Asteriarum, p. 12.

1841. *Asterina gibbosa*, Forbes, British Starfishes, p. 119.

1842. *Asteriscus verruculentus*, Müller & Troschel, Syst. der Asteriden, p. 41.

Dujardin and Hupé, in their 'Histoire Naturelle des Zoophytes Échinodermes,' published in 1862, say of this species, "Les pédicellaires sont nombreuses, sétacées, placées entre les plaques"; but, although we have examined it most carefully, we are unable to detect any such organs as are described in these words. But, although true pedicellariæ appear to be wholly absent in *Asterina gibbosa*, there are certain spines in this species which may, perhaps, in some degree discharge the functions of these appendages. The spines of the surface are usually arranged in groups of three or four together; but between these groups there will be noticed not unfrequently pairs of spines, of similar character in their general structure to the other spines of the surface, but placed close together at the base, and of slightly arched form, so that the apices can be brought into contact with each other. We seem to have here a transition state between ordinary spines and true pedicellariæ: the form and structure is more that of

the former, but the function may in some degree be that of the latter; and these arching spines are perhaps employed as imperfect instruments of prehension.

This species is, for the most part, a southern form; but it is met with here and there on the western shores of Great Britain, and attains its northern limit on the coast of Rosshire, where it was found by Professor Edward Forbes. It appears to be entirely absent on the east coast.

Genus XV. SOLASTER, Forbes.

[*Solaster*, Forbes, 1839. *Crossaster*, Müller & Troschel, 1840.]

Body convex, covered above and below with paxillæ. Rays 8-14, long, rounded above. No marginal plates or rows of spines edging the disk and arms. Respiratory pores very numerous, everywhere situated between the paxillæ. Suckers biserial. No pedicellariæ. Anus central. Madreporiform tubercle midway between the centre and the margin of the disk.

Solaster papposus (Linnæus).

Solaster papposa, Forbes, British Starfishes, p. 112.

Everywhere round our coasts. Not known to the south of Great Britain; but extending northwards to Scandinavia, Finland, Iceland, Greenland, and western North America.

Solaster endeca (Linnæus).

Solaster endeca, Forbes, British Starfishes, p. 109.

With similar British and exotic range to the last; but not so abundant, and an inhabitant of deeper water, never occurring between tide-marks.

Genus XVI. PORANIA, Gray.

[*Goniaster*, Agassiz, 1857 (partly). *Porania*, Gray, 1841. *Asteropsis*, Müller & Troschel, 1842.]

Body pentagonal, very convex and tumid above, flat beneath. Rays very short. Oral surface composed of elegantly tessellated plates. Aboral surface composed of similar but less regular plates, and covered, when alive, with a thick and highly lubricated membrane. No spines, or paxillæ, or pedicellariæ, except that a circlet of small spines closes over the anal opening, which is central, and that the sharp edge of the disk and rays is fringed with a row of spines arranged in single file. Respiratory pores very numerous, in groups. Suckers biserial. Madreporiform tubercle midway between the centre and the margin of the disk.

Porania pulvillus (O. F. Müller).

1788. *Asterias pulvillus*, Müller, Zool. Dan. vol. i. p. 19, pl. xix. figs. 1, 2.

1839. *Goniaster Templetoni*, Forbes, Mem. Wern. Soc. vol. viii. p. 118, pl. iv. fig. 2.
 1841. *Porania gibbosa*, Gray, Ann. Nat. Hist, vol. vi. p. 288.
 1842. *Asteropsis pulvillus*, Müller & Troschel, Syst. der Aster. p. 14.

Porania pulvillus, though not common, occurs on the southern, western, and northern coasts of Great Britain; but is wholly absent on the east, where its place is taken by the next species. It is an inhabitant of the Norwegian and Swedish seas.

Genus XVII. GONIASTER, Agassiz.

[*Goniaster*, Agassiz, 1837. *Hippasteria*, Gray, 1841. *Astrogonium*, Müller & Troschel, 1842.]

Body pentagonal, flat beneath, convex above; rays of moderate length. Oral and aboral surfaces covered with elegantly tessellated plates, each of which is surrounded by a row of granules, and bears on its centre either a large tubercle or a semi-elliptic pedicellaria. Two rows of square marginal plates, each surrounded by a beaded margin of granules, and bearing one, two, or three strong tubercular spines. Respiratory pores in the narrow interspaces of the plates. Suckers biserial. Anus sub-central. Madreporiform tubercle nearer to the centre than to the margin of the disk.

Goniaster phrygianus (Parelius).

1768. *Asterias phrygiana*, Parelius, Kong. Norske Videnskabers Selskabs Skrifter (Act. Nidros.), vol. iv. p. 424, pl. xiv. figs. 1, 2.
 1788. *Asterias equestris*, Gmelin?, Lin. Syst. Nat. no. 3164.
 1841. *Goniaster equestris*, Forbes, British Starfishes, p. 125.
 1841. *Hippasteria plana*, *Europæa*, and *Johnstoni*, Gray, Ann. Nat. Hist. vol. vi. p. 279.
 1842. *Astrogonium phrygianum*, Müller & Troschel, Syst. der Asteriden, p. 52.
 1843. *Goniaster Abbensis*, Forbes, Ann. Nat. Hist. vol. xi. p. 280, pl. vi.
 1857. *Astrogonium aculeatum*, Barrett, Ann. Nat. Hist. ser. 2. vol. xx. p. 47, pl. iv. fig. 4 (variety).
 1861. *Astrogonium phrygianum*, var., Sars, Oversigt af Norges Echinoderm, p. 44 (variety).

This species is found in deep water off the Shetland and Orkney Islands and the north of Scotland, and ranges thence down the eastern side of Great Britain as far south as Yorkshire. It is a member of the fauna of Norway, Sweden, Finmark, and western North America.

The pedicellariæ of this species differ wholly in form from those of all other British Echinodermata. They consist of two semielliptic, slightly arched, strong, calcareous valves which close over an aperture in the plate to which they are attached. The muscles by which the pedicellariæ are worked pass through the aperture just mentioned. It is not uncommon to find grains of

sand or small animals—for example, Copepod Crustacea—held tight in the grasp of these pincer-formed organs.

A remarkable variety of this species was described, from the Norway coast, by Mr. Barrett, under the name of *Astrogonium aculeatum*. It differs from the type in having the tubercular spines of the aboral surface less strongly developed than usual, and those of the superior lateral plates wholly absent. In these respects it shows some approach towards *Goniaster granularis* (O. F. Müller). This form has for the first time been found in the British seas, during the past summer, by Messrs. Jeffreys and Waller, who procured it in very deep water off Shetland. Although at first sight it looks very different from the type, I have intermediate forms in my collection, and am satisfied that Professor Sars is right in having regarded it as a variety of the present species.

Genus XVIII. CRIBRELLA, Agassiz.

[*Linckia*, Nardo, 1834 (nom. usit.). *Cribrella*, Agassiz, 1837. *Henricia*, Gray, 1841. *Echinaster*, Müller & Troschel, 1842 (partly).]

Body convex, with five very long, slender, and well-rounded rays; covered in every part with tufts of short spines. No marginal plates. Numerous isolated pores for the protrusion of respiratory tentacles in the intervals of the tufts of spines. Suckers biserial. Anus subcentral. No pedicellariæ. Madreporiform tubercle, covered with spines, situated midway between the centre and margin of the disk.

Forbes spelt the name of this genus *Cribella*; but Agassiz's rendering of it is *Cribrella*—from *cribrum*, not from *cribellum*.

Cribrella sanguinolenta (O. F. Müller).

1776. *Asterias sanguinolenta*, Müller, Zool. Dan. Prod. p. 234. no. 2836.
 1777. *Asterias oculata*, Pennant, Brit. Zool. vol. iv. p. 61, no. 46. pl. xxx. figs. 5, 6.
 1841. *Cribella oculata*, Forbes, British Starfishes, p. 100.
 1841. *Henricia oculata*, Gray, Ann. Nat. Hist. vol. vi. p. 184.
 1842. *Echinaster oculatus*, Müller & Troschel, Syst. der Aster. p. 24.
 1842. *Echinaster Eschrichtii*, Müller & Troschel, Syst. der Asteriden, p. 25 (fide Sars).
 1844. *Echinaster Sarsii*, Müller & Troschel, Archiv für Naturgeschichte, vol. x. p. 179 (fide Sars).
 1853. *Linckia oculata et pertusa*, Stimpson, Invertebrata of Grand Manan, p. 14.
 1857. *Cribrella sanguinolenta*, Lütken, Oversigt over Grönlands Echinodermata, p. 31.

Cribrella sanguinolenta occurs all round the coasts of Great Britain and Ireland, and in all depths of water from between tide-marks down to 100 fathoms. It is a very variable species; and more than one of its forms we have at times been inclined almost

to regard as distinct species. The variety from the deepest water of the Shetland Islands is peculiarly marked. It rarely exceeds 2 inches in its greatest diameter, is of a brilliant saffron-yellow colour, and has the rays peculiarly rounded and firmer in structure than usual. The spines, also, are much shorter and more delicate than in ordinary specimens, and have their apices much more distinctly trifold.

The largest specimens which we have seen of this species are in Mr. Bean's collection, and were procured by him at Scarborough. A monstrosity in our collection has six, and another seven rays.

Cribrella sanguinolenta is an Arctic species of very extensive range. It has been met with in the seas of Norway, Sweden, the Faro Islands, Finmark, Iceland, Greenland, western North America, and Kamtschatka.

Fam. III. Asteriadæ.

A special anal opening. Four rows of ambulacral tentacula.

Genus XIX. STICHAster, Müller & Troschel.

[*Stichaster*, Müller & Troschel, 1840. *Asteracanthion*, Müller & Troschel, 1842 (partly).]

Body convex, with five greatly elongated, slender, compact, well-rounded rays, closely covered above by short tubercular spines, and pierced with very numerous tentacular pores arranged in longitudinal rows. No marginal plates or spines. Suckers quadriserial. Anus central. Pedicellariæ numerous, of one kind only. Madreporiform tubercle close to the margin of the disk, not covered with spines.

The presence of four, instead of two, rows of ambulacral tentacula give the *Asterias rosea* of Müller claims to be placed, not only in a different genus, but in a different family from the *Asterias sanguinolenta* of the same author, with which it was associated by Professor Forbes in the genus *Cribrella*. The species has closer affinities with *Asterias* restricted (*Asteracanthion*, M. & T.), in which genus it was arranged by Müller and Troschel in their 'System der Asteriden.' The peculiarly produced, well-rounded, compact arms of this species, with the close covering of tubercular spines, and the lateral position of the Madreporiform tubercle, justify its separation from the typical species of *Asterias*.

Stichaster roseus (O. F. Müller).

1776. *Asterias rosea*, Müller, Zool. Dan. Prod. p. 234. no. 2837.

1841. *Cribella rosea*, Forbes, British Starfishes, p. 106.

1842. *Asteracanthion roseus*, Müll. & Troschel, Syst. der Asteriden, p. 17.

1861. *Stichaster roseus*, Sars, Oversigt af Norges Echinodermer, p. 86.

A deep-water species, an inhabitant of the Scandinavian seas.

Though scarce, it appears to have been found, here and there, round our coast. We have ourselves taken it off Shetland and the Northumberland coast, and have received it from Mr. T. Edward, from the Moray Firth.

Genus XX. ASTERIAS, Linnæus.

[*Asterias*, Linnæus, 1748. *Stellonia*, Nardo, 1834 (partly). *Uraster*, Agassiz, 1837. *Asteracanthion*, Müller & Troschel, 1840.]

Body with five elongated, subcompressed or moderately convex and often angulated rays, furnished with spines placed singly, and either scattered over the surface or arranged in regular longitudinal lines. No marginal plates or spines. Suckers quadriserial. Anus central. Pedicellariæ of one or two kinds: the one small, with interlocking blades always present and grouped round the base of the spines; the second form much larger than the first, pincer-formed, and, when present, scattered over the surface. Madreporiform tubercle situated midway between the centre and the margin of the disk.

Müller and Troschel, in their 'System der Asteriden,' have wholly suppressed the Linnæan genus *Asterias*, and have been followed by most Continental authors who have of late years written upon the Echinodermata. Such a proceeding, however, is on all accounts most undesirable, and wholly at variance with the established laws of nomenclature. What species, then, is to be regarded as the type of the Linnæan genus? Opinion has been in some measure divided between the *Asterias rubens* and the *A. aurantiaca*. It is to the latter species and its allies that the genus was restricted by Agassiz, who was followed by Forbes, as well as by Müller and Troschel in their first memoir in the 'Bericht der Berliner Akademie' for 1840. But for this species Linck had established a genus, *Astropecten*, in 1733. His work 'De Stellis marinis' was an excellent monograph, when we consider the period at which it was published; and by general consent, and with great justice, his genus is now recognized. There are other reasons, also, which seem to point to *Asterias rubens* as the most proper type of the Linnæan genus; and we have therefore followed Dr. Gray in so regarding it. Moreover, if *Asterias* were rejected as the generic name for this species, Müller and Troschel's *Asteracanthion* could not be adopted, since both *Stellonia* of Nardo and *Uraster* of Agassiz have precedence of that genus.

Asterias glacialis, Linnæus.

Uraster glacialis, Forbes, British Starfishes, p. 78.

Rays distinctly angulated, having three distinct and very conspicuous longitudinal rows of large spines extending the

whole length of their upper surface, and terminating at a circlet of similar spines on the disk. Under surface of arms margined with a double row of spines, of which the outer are the longer; and having very numerous small spines arranged in single file overhanging the ambulacra. Ambulacra wide at the base, and thence gradually tapering to the extremity of the rays. Pedicellariæ of two kinds,—the one very small, composed of two interlocking blades, grouped in vast numbers round the base of the spines; the other very much larger, pincer-formed, with simple margins and a somewhat digitiform apex, scattered over the surface. Greater to lesser radius as 7–8 to 1. A large species, measuring commonly from 1 to 2 feet across, and sometimes attaining yet greater dimensions.

It is not a little remarkable that this species, which is found in the Mediterranean and ranges to Finmark and Scandinavia, and is of frequent occurrence on the northern, western, and southern coasts of our islands, appears to be wholly absent from the east coast of England and Scotland. It is recorded in the "Dredging Reports of the Durham and Northumberland Coast," by Messrs. Brady and Hodge (Tyneside Nat. Field-Club Trans. vol. v. p. 285, and vol. vi. p. 190),—but erroneously, as the specimens referred to belong to the next species, which at the time of the drawing up of those Reports was not known, except to myself, as an inhabitant of the British seas.

Asterias Mülleri (Sars).

1846. *Asteracanthion Mülleri*, Sars, Fauna Litt. Norvegiæ, i. p. 56, pl. 8. figs. 38, 39.
 1861. *Asteracanthion Mülleri*, Sars, Oversigt af Norges Echinodermer, p. 88.

Rays very convex, but not angulated: spines not large, more numerous than in the last species, and more irregularly disposed, but forming five longitudinal rows (namely, one central and two lateral on each side), the spines of all of which are of equal size. Spines of disk irregularly placed, not forming a distinct circlet. Under surface of rays as in the last species; but the spines bordering on the ambulacra larger in proportion to size of specimen, and therefore less numerous than in *A. glacialis*. Pedicellariæ of one kind only, minute, with interlocking blades, grouped round the base of the spines, but less numerous than in the last species; and the second and larger form, which is present in the latter, is wholly absent in this species. Greater to lesser radius as 4–6 to 1. More nearly allied to *A. glacialis* than to *A. rubens*. The British examples that I have seen do not exceed 2 inches

in diameter; but Sars gives $4\frac{1}{2}$ inches as the measurement of a Norwegian specimen, but adds, "sæpissime minor."

This pretty little species, now first recorded as British, was first procured by me in 1861, when dredging at Shetland in company with my friend Mr. Jeffreys. It has since been obtained, as already mentioned, on the Durham coast. When alive, it is whitish, with more or less of a rosy pink colour on the upper surface.

Asterias rubens, Linnæus.

Uraster rubens, Forbes, British Starfishes, p. 83.

Rays moderately convex, gently rounded; spines small, not clavate, irregularly disposed over the surface of the disk and rays, except that there is a central line more or less distinct, and that the sides of the rays are bounded below by a fringe of spines, which are somewhat larger than those of the rest of the surface, and are placed in pairs or threes, two or sometimes three spines being situated on each plate. Under surface of rays having exteriorly groups of spines, generally three in number, placed diagonally on each plate, and interiorly on the adambulacral plates more slender spines, arranged in two or three rows bordering on the ambulacra. Ambulacra wide at the base, and gradually narrower towards the extremity of the rays. Pedicellariæ of two kinds,—the smaller of the same character as those of *A. glacialis*; the larger pincer-formed kind consisting of two blades with serrated edges, very numerous, scattered over the surface. Greater to lesser radius about as 5 to 1. A large species, often a foot or even a foot and a half in diameter.

Everywhere round our shores.

Asterias violacea, O. F. Müller.

Uraster violacea, Forbes, British Starfishes, p. 91.

Closely allied to the last species, but does not attain such a large size. Spines somewhat clavate. Pedicellariæ, especially of the larger kind, far less numerous. Ambulacra distinctly contracted at the base, then widening, and afterwards tapering (more suddenly than in the last species) to the apex of the rays.

As widely distributed as the last, but apparently not found in such deep water.

Asterias hispida, Pennant.

Uraster hispida, Forbes, British Starfishes, p. 95.

Rays moderately convex, not angulated, very short. Spines small, somewhat clavate, not arranged in well-defined rows. Ambulacra partaking of the same form as the rays, short,

wide at the base, suddenly tapering at the apex. Pedicellariæ of one kind only, and very sparingly developed; the larger pincer-formed kind wholly absent. Greater to lesser radius as 2-3 to 1. A large specimen measures $1\frac{1}{2}$ inch in its greatest diameter.

We have found this species living gregariously between tide-marks at the Out-Skerries, Shetland; and Mr. D. Robertson has sent us specimens which he took under similar circumstances at Oban.

The species of *Asterias*, both British and foreign, allied to *A. rubens* are extremely difficult. We are unable to make up our minds whether we have only one very variable form or many species. We have described the two species distinguished by Forbes, *A. violacea* and *A. hispida*, but for the present feel compelled to reserve giving a positive opinion with respect to the value of their distinctive characters. Müller and Troschel, and also Sars, unite the former with *A. rubens*. We have other closely allied forms in our seas, which scarcely fall under the description of any species here described.

XIV.—Description of *Diphlogæna Hesperus*, a new Species of the Family Trochilidæ. By JOHN GOULD, F.R.S.

Male. Crown of the head brilliant, changeable, metallic blue and fiery red, the latter colour occupying the sides of the forehead, and the former running up the centre from the base of the bill to the crown, where it dilates into a broad patch; hinder part of the head and the nape changeable brown and bronze; back (as far as the rump, shoulders, abdomen, and flanks) green; throat and chest rich metallic golden green, with a small spot of violet in the centre of the former; primaries and secondaries rust-brown, with darker tips; upper and under tail-coverts and the forked tail deep cinnamon-red, the feathers of the latter tipped and edged near the extremities with bronzy green; thighs buff; bill straight, long, tubular, and black; feet brown. Total length $5\frac{1}{4}$ inches, bill $1\frac{1}{2}$, wing $3\frac{1}{4}$, tail $2\frac{1}{2}$.

Habitat. The province of Cuença, in Ecuador, where it procures its food from the flowers of the *Oreocallis grandiflora*, a tall shrub figured in Humboldt and Bonpland's folio work, vol. ii. p. 179, tab. 139.

This new species of Humming-bird is very nearly allied to *Diphlogæna Iris*, but differs in the more fiery colour of the face, the greater intensity of the blue occupying the centre of the crown, in the green of the body extending to the tail-coverts both on the upper and under surface, in the tail-feathers being all tipped with bronzy green, and in the tail itself being less deeply forked.